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Fifth Edition

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Editor in Chief

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On the cover: Photomicrograph of crystals of vitamin B₁.
(Dennis Kunkel, University of Hawaii)

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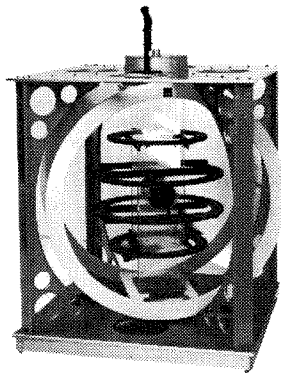
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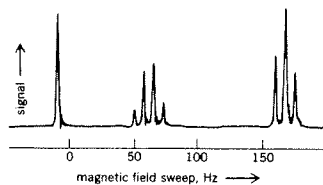
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PROTON MAGNETOMETER



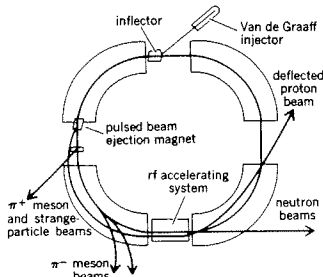
The water container and biasing coil assembly of the proton vector magnetometer. Instrument measures frequency of voltage induced in coil by the protons in water. (U.S. Coast and Geodetic Survey)

PROTON RESONANCE



Proton resonance spectra of ethyl alcohol at 40 megahertz. The three main resonance frequencies are due to protons in the OH, CH₂, and CH₃ groups respectively. (From J. D. Roberts, *Nuclear Magnetic Resonance*, McGraw-Hill, 1959)

PROTON SYNCHROTRON



Schematic diagram of the principal components of a proton synchrotron.

cious organisms in which the female reproductive structures mature before the male structures. { 'prō'tāj-ə-nē }

protoplast [BOT] A cell of a plant or alga, usually a green alga, which has been removed from its cell wall. { 'prō'tō-plast }

protolith [PETR] The original, unmetamorphosed rock from which a given metamorphic rock is formed. { 'prōd-ə-lith }

Protomastigida [INV ZOO] The equivalent name for Kinetoplastida. { ,prōd-ō-ma'stij-ə-dā }

protomer [BIOCHEM] One of the polypeptide chains composing an oligomeric protein. Also known as subunit. { 'prōd-ə-mər }

Protomonadina [INV ZOO] An order of flagellates, subclass Mastigophora, with one or two flagella, including many species showing protoplasmic collars ringing the base of the flagellum. { ,prōd-ō-mān-ə-dī-nā }

Protomonida [INV ZOO] The equivalent name for Protomonadina. { ,prōd-ō-mān-ə-dā }

protomylonite [PETR] A mylonitic rock that develops from contact-metamorphosed rock; granulation and flowage are caused by overthrusts following the contact surfaces between the intrusion and the country rock. { ,prōd-ō-mī-lā-nīt }

Protomyzostomidae [INV ZOO] A family of parasitic polychaetes belonging to the Myzostomaria and known for three species from Japan and the Murman Sea. { ,prōd-ō-mī-zə'stām-ə,dē }

proton [PHYS] An elementary particle that is the positively charged constituent of ordinary matter and, together with the neutron, is a building block of all atomic nuclei; its mass is approximately 938 mega-electronvolts and spin 1/2. { 'prō,tān }

proton accelerator [NUCLEO] A particle accelerator which accelerates protons to high energies, as opposed to one which accelerates heavier ions or electrons. { 'prō,tān ak'sel-ə-rā-dər }

proton acid See Brönsted acid. { 'prō,tān 'as-əd }

protonate [CHEM] To add protons to a base by a proton source. { 'prōt-ən,āt }

proton capture [NUC PHYS] A nuclear reaction in which a proton combines with a nucleus. { ,prō,tān 'kap-čər }

proton drip-line [NUC PHYS] On a chart of the nuclides, which plots proton number versus neutron number, the boundary beyond which proton-rich nuclei are unstable against proton emission. { 'prō,tān 'drip,līn }

proton-electron-proton reaction [NUC PHYS] A nuclear reaction in which two protons and an electron react to form a deuteron and a neutrino; it is an important source of detectable neutrinos from the sun. Abbreviated PeP reaction. { 'prō,tān i'lek-trān 'prō,tān rē,ak-shən }

protonema [BOT] A green, filamentous structure that originates from an asexual spore of mosses and some liverworts and that gives rise by budding to a mature plant. { ,prōt-ən-ē-mā }

protonephridium [INV ZOO] 1. A primitive excretory tube in many invertebrates. 2. The duct of a flame cell. { ,prōd-ō-nā'frīd-ē-əm }

protonic acid See Brönsted acid. { 'prō'tān-ik 'as-əd }

proton-induced x-ray emission [ANALY CHEM] A method of elemental analysis in which the energy of the characteristic x-rays emitted when a sample is bombarded with a beam of energetic protons is used to identify the elements present in the sample. Abbreviated PIXE. { 'prō,tān in,düst 'eks,rā i,mī-shən }

protonium [ATOM PHYS] A bound state of a proton and an antiproton. { 'prō'tō-nē-əm }

proton magnetometer [ELECTROMAG] A highly sensitive magnetometer which measures the frequency of the proton resonance in ordinary water. { 'prō,tān ,mag-nā'tām-əd-ər }

proton microscope [ELECTR] A microscope that is similar to the electron microscope but uses protons instead of electrons as the charged particles. { 'prō,tān 'mīkrə-skōp }

proton moment [NUC PHYS] The magnetic dipole moment of the proton, a physical constant equal to $(1.41062 \pm 0.00001) \times 10^{-23}$ erg per gauss. { 'prō,tān ,mō-mənt }

proton number See atomic number. { 'prō,tān ,nəm-bər }

proton-proton chain [NUC PHYS] An energy-releasing nuclear reaction chain which is believed to be of major importance in energy production in hydrogen-rich stars. Also known as deuterium cycle. { 'prō,tān 'prō,tān ,čān }

proton-proton reaction [NUC PHYS] The initiating reaction

in the proton-proton chain, in which a deuteron, a positron, and a neutrino.

{ 'prō,tān 'prō,tān rē,ak-shən }

proton-proton scattering [NUC PHYS] A process in which a proton and another proton, usually the nuclei of two atoms, interact. { 'prō,tān 'prō,tān 'skad-ər-iŋ }

proton-recoil counter [NUCLEO] A counter for fast neutrons. { 'prō,tān 'rē,kōil ,kaŋ-taŋtər }

proton resonance [SPECT] A phenomenon in which atoms absorb energy from an alternating magnetic field; this phenomenon is used in resonance quantitative analysis techniques. { 'prō,tān 'rē,kōil ,kaŋ-taŋtər }

proton-rich nucleus [NUC PHYS] A nucleus in which the ratio of proton number to neutron number is greater than that of nuclei found in nature. { 'prō,tān 'rē,kōil ,kaŋ-taŋtər }

proton scattering microscope [SOLID STATE] A microscope in which protons produced in a cold-cathode electron gun are accelerated and focused on a crystal in a vacuum; the reflected protons are detected by a fluorescent screen and the crystal strike a fluorescent screen and the photographable display that of the target crystal. { 'prō,tān 'skad-ər-iŋ ,mīkrə-skōp }

proton stability constant [PHYS CHEM] A dissociation constant of a weak base. { 'prō,tān 'stā-bil-əd-ē ,kän-stənt }

proton storage ring [NUCLEO] A ring of magnets and vacuum chambers in which beams of protons can be stored. { 'prō,tān 'stōr-iŋ ,rīŋ }

proton synchrotron [NUCLEO] A particle accelerator in which protons move in circular orbits in a time-varying magnetic field; the orbit radius is kept constant. { 'prō,tān 'sīŋ-kro-tro-n ,rīŋ }

proton vector magnetometer [ELECTROMAG] A magnetometer with a system of alternating magnets and vacuum chambers in which beams of protons can be stored. { 'prō,tān 'vek-tər ,māg-nē'tām-əd-ər }

protophilic [CHEM] Strongly basic.

protophloem [BOT] The initial part of the phloem from the procambium. { 'prōd-ə'flō-ē ,m }

Protophyta [BOT] A division of the plant kingdom, set up by one system of classification, to include the blue-green algae, and the viruses.

protoplasm [CYTOL] The colloidal material of a cell, composed of the living material of a cell.

protoplast [CYTOL] The living portion of a cell; includes the cytoplasm, the nucleus, and the cell membrane. { 'prōd-ə-plast }

protoplast fusion [GEN] A technique in which protoplasts are joined or a protoplast is joined to another cell in order to accomplish a genetic cross. { 'prōd-ə-plast ,fyū-zhən }

protopodite [INV ZOO] The basal segment of a limb bearing an endopodite or exopodite.

Protopteridales [PALEOBOT] An extinct order of ferns. { ,prōd-ō'ter-əd-ā-lēz }

protoquartzite [PETR] A well-sorted sedimentary rock intermediate in composition between sandstone and quartzite, consisting of 75–95% quartz and 5–25% detrital clay matrix and 5–25% unconsolidated detrital grains. Also known as quartzose sandstone. { 'prōd-ō'kwōrt-sīt }

protore [MIN ENG] 1. A primary mineral. 2. A deposit which could become economically important if a technological change occurred or occurred. { 'prōd-ər }

Protosireninae [PALEON] An extinct subfamily of the family Dugongidae found in Egypt. { ,prōd-ō'ser-ē-nā ,nē }

Protospondylii [VERT ZOO] An extinct subfamily of the family Spondylii.

protostar [ASTRON] A flattened mass of gas and dust hypothesized to form into a star. { 'prōt-ō'stār }

protostele [BOT] A stele consisting of a single vascular bundle surrounded by phloem. { 'prōd-ə'stēl }

Protostomia [INV ZOO] A major division of the phylum